99. An apparatus according to claim 97 wherein the foreline comprises a diameter of less than about 80 mm.

100. An apparatus according to claim 97 wherein the pump comprises a pre-vacuum pump or a low vacuum pump.

101. An apparatus according to claim 97 further comprising a pump controller adapted to control a rate of evacuation of the gas in the chamber by changing a speed of the pump.

REMARKS

This is intended as a full and complete response to the Office Action dated August 30, 2001, having a shortened statutory period for response set to expire on November 30, 2001.

Claims 1-101 are pending in the application. Claims 21-37 and 76-83 have been withdrawn from consideration. Claims 24-30, 38-75 and 84-91 are allowed.

Claims 1, 5-6, 16, and 22 stand rejected under 35 U.S.C. 102(a) as being anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over U.S. Patent No. 5,709,753 to Olson (hereinafter *Olson*). According to the Examiner, *Olson* teaches a process chamber that is evacuated by a vacuum pump located close to the process chamber. The vacuum pump discharges to atmospheric pressure.

Applicants respectfully traverse the rejection. *Olson* teaches a pump used in the chemical deposition of Parylene AF4 onto silicon wafers. The pump appears to be used below a process chamber (Figure 6). The pump of *Olson* has a relatively low pumping capacity and is incapable of rapidly evacuating gas from a chamber as is required with the substrate processing apparatus of the present application. Specifically, the pump of *Olson* is a "Drytel Series dry pump manufactured by Alcatel, Inc." (*Olson* page 9, lines 27-34). As discussed in the accompanying statement of inventor Pedram Sabouri and the appended material from Alcatel, Inc., the pump of *Olson* would be wholly inadequate in use with a substrate processing system requiring rapid pump down of a load lock chamber or high capacity pumping in a deposition process performed with the

apparatus disclosed in the application. Neither is the pump of claims 1 and 16 obvious in light of *Olson*. Because the pump of *Olson* cannot operate effectively in an apparatus like the one described in the application, it would not be obvious to attempt to utilize such a pump. *Olson* therefore, does not teach, show or suggest a high capacity pump for rapidly evacuating a chamber as set forth in independent claims 1, 16 and the claims that depend therefrom. Applicants, therefore, respectfully submit that claims 1, 5-6, 16 and 22 are patentable over *Olson* and request allowance of these claims.

Claims 2-5, 19-22, 92-95 and 97-100 stand rejected under 35 U.S.C. 103(a) as being unpatentable over *Olson*. According to the Examiner, the particular pipe sizes recited in these claims are obvious in view of *Olson*. Applicants respectfully traverse the rejection. As stated herein, *Olson* does not teach, show or suggest the apparatus of claims 1 and 19 with a high capacity pump for rapidly evacuating gas in a chamber. *Olson* also does not anticipate or make independent claims 92 or 97 obvious, as those claims are also directed to a high capacity pump for rapidly evacuating a chamber. Therefore, claims 2-5, 19-22, 92-95 and 97-100 are patentable over *Olson* and Applicants request allowance of those claims.

Claims 1, 5-6, and 8-9, and 16 stand rejected under 35 U.S.C. 102(e) as anticipated, or, in the alternative, under 35 U.S.C. 103(a) as obvious over U.S. Patent No. 5,904,952 to Lopata (hereinafter *Lopata*). According to the Examiner, the low vacuum pump of *Lopata* is not far from either the load lock chamber or the process chamber and is therefore "adjacent".

Applicants respectfully traverse the rejection. *Lopata* teaches a method of depositing a hard silicon oxide based film. The apparatus includes diffusion pumps and mechanical pumps. *Lopata* does not teach a high capacity pump adjacent to a chamber with an outlet that exhausts the evacuated gas to atmospheric pressure. While Figure 2 of *Lopata* shows all pumps near the chamber, *Lopata* is a prior art apparatus utilizing large, noisy pre-vacuum pumps that would certainly be located remotely of a chamber. As discussed in the accompanying statement of inventor Pedram Sabouri, there is no teaching anywhere in *Lopata* that the pumps are physically located near the chambers. Neither does *Lopata* make any suggestion of such an arrangement since prior art, high capacity dry pumps are not locatable adjacent chambers of an apparatus like the one

described in the present application. Therefore, Applicants submit that claims 1, 5-6, 8-9 and 16 are patentable over *Lopata*.

Claims 2-5, 10-14, 19-21, 92-95 and 97-100 stand rejected under 35 U.S.C, 103(a) as being unpatentable over *Lopata*. According to the Examiner, the particular pipe sizes recited in these claims are obvious in view of *Lopata*. Applicants respectfully traverse the rejection. For the reasons stated above, independent claims 1 and 16 and the claims that depend therefrom are patentable over *Lopata*. Independent claims 92 and 97 are also not anticipated or made obvious in light of *Lopata* since *Lopata* does not teach a pump adjacent a chamber, the pump exhausting evacuated gas to atmospheric pressure. Therefore, claims 2-5, 10-14, 19-21, 92-95 and 97 are patentable over of *Lopata*.

Claims 10-6, 8-14, 16, 19-21, 92-95 and 97-100 stand rejected under 35 U.S.C. 103(a) as being unpatentable over *Lopata* in view of *Olson*. According to the Examiner, if the low vacuum pump of *Lopata* were not considered adjacent to the chamber, it would have been obvious to place it adjacent to the chamber in view of *Olson*, which teaches that a low vacuum pump can be successfully placed adjacent a process chamber.

Applicants respectfully traverse the rejection. As stated herein, and as supported by the attached declaration by inventor Sabouri, neither *Olson* nor *Lopata* alone or in combination teach or suggest the apparatus of independent claims 1, 16, 92 or 97. Specifically, neither reference teaches or suggests a high capacity pump adjacent a chamber, for rapidly evacuating a chamber. In fact, the pump of *Olson*, because it is such a low capacity pump, actually teaches away from the use of a high capacity pump near a chamber. Therefore, Applicants submit that claims 1-6, 8-14, 16, 19-21, 92-95 and 97-100 are patentable and request allowance of those claims.

Claims 16-20 stand rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,080,679 to Suzuki (hereinafter *Suzuki*). According to the Examiner, *Suzuki* discloses a high vacuum process chamber in which a low vacuum pump is connected to the process chamber and a high vacuum pump. According to the Examiner, it is inherent in the set-up illustrated by *Suzuki* that the pump be not far from the chamber. Alternatively, it is obvious that the low vacuum pump could be not far

from the chamber. Since "far" and "not far" are relative terms with wide limits of interpretation, it is proper to say that the low vacuum pump of *Suzuki* is inherently not far from the chamber or that it is obvious to place the pump not far from the chamber.

Applicants respectfully traverse the objection. *Suzuki* teaches an apparatus for gradually reducing the pressure inside a vacuum chamber using valves. *Suzuki* includes various diagrams to introduce components, including block diagrams. *Suzuki* does not teach or suggest a pre-vacuum pump adjacent a process chamber. Figure 16, relied upon by the Examiner, is clearly defined by the specification as a "block" diagram (col. 1, line 25) with only the most rudimentary shapes depicting the various components. Even in this form, the rectangular shape depicting the dry pump 603 is farther away from the chamber than any of the other components. The relative location of the pump 603 to the chamber makes it clear that it is not intended to be "close to" the chamber. *Suzuki* actually teaches away from the present invention by illustrating the pump at such a relatively great distance from the chamber. Therefore, claims 16-20 are in condition for allowance and the same is respectfully requested.

Applicants gratefully acknowledge the allowance of claims 24-30, 38-75 and 84-91. The Examiner stated that Claims 7, 15, 23, 96 and 101 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Applicants submit herewith new claims 102-106, rewritten in independent format with the claim limitations including the base claim and any intervening claims.

In conclusion, the references cited by the Examiner, neither alone nor in combination, teach, show, or suggest the method or process of the present invention. Having addressed all issues set out in the office action, applicants respectfully submit that the claims are in condition for allowance and respectfully request that the claims be allowed.

The prior art made of record is noted. However, it is believed that the secondary references are no more pertinent to the Applicants' disclosure than the primary references cited in the office action. Therefore, it is believed that a detailed discussion of the secondary references is not deemed necessary for a full and complete response to this office action. Accordingly, allowance of the claims is respectfully requested.

Respectfully submitted,

William B. Patterson
Registration No. 34,102
MOSER, PATTERSON & SHERIDAN, L.L.P.
3040 Post Oak Blvd., Suite 1500
Houston, TX 77056
Telephone: (713) 623-4844
Facsimile: (713) 623-4846
Attorney for Applicants

APPENDIX

1. (Amended) An apparatus for processing a substrate, the apparatus comprising:

(a) a chamber; and

(c) a high capacity pump adjacent to the chamber, the pump having an inlet connected to the chamber to rapidly evacuate gas in the chamber and an outlet that exhausts the evacuated gas to atmospheric pressure.

2. (Amended) An apparatus according to claim 1 further comprising a foreline extending between the inlet of the pump and the chamber, the foreline having a length of less than about [2]3 m.

9. (Amended) An apparatus for processing a substrate, the apparatus comprising:

(a) a load-lock chamber comprising an enclosure; and

(b) a pump adjacent the load-lock chamber, the pump having an inlet connected to the load-lock chamber to rapidly evacuate gas from the load-lock chamber and an outlet that exhausts the gas to atmospheric pressure.

11. (Amended) An apparatus according to claim 9 further comprising a foreline extending between the inlet of the pump and the load-lock chamber, the foreline having a length of less than about [2]3 m.

16. (Amended) An apparatus for processing a substrate, the apparatus comprising:

(a) a process chamber comprising a support and a gas distributor; and

(b) a high capacity pumping system comprising a pre-vacuum pump adjacent to the process chamber, the pre-vacuum pump having an inlet connected to the process chamber to evacuate gas from the process chamber and an outlet that exhausts the evacuated process gas to atmospheric pressure,

whereby a substrate held on the support is processed by process gas introduced through the gas distributor into the process chamber.

19. (Amended) An apparatus according to claim 16 further comprising a foreline extending between the inlet of the pre-vacuum pump and the process chamber, the foreline having a length of less than about [2]3 m.

92. (Amended) An apparatus for processing a substrate, the apparatus comprising:

(a) a chamber capable of holding a substrate and processing the substrate in a gas; and

(b) a high capacity pump having an inlet connected to the chamber via a foreline for rapidly evacuating gas in the chamber, the foreline having an internal surface area of less than about 0.4 m^2 for a length of about [2] 3 m, [and] the pump having an outlet that exhausts the evacuated gas to atmospheric pressure.

97. (Amended) An apparatus for processing a substrate, the apparatus comprising:

(a) a chamber capable of holding a substrate; and

(b) a high capacity pump having an inlet connected to the chamber via a foreline for rapidly evacuating gas in the chamber, the foreline having an internal surface area of less than about 0.4 m^2, [and] the pump having an outlet that exhausts the evacuated gas to atmospheric pressure.